AUTOMATION-INTERFACE DESIGN TOOLS DEVELOPMENT:

Accelerating Space Exploration with Task Analysis Tools

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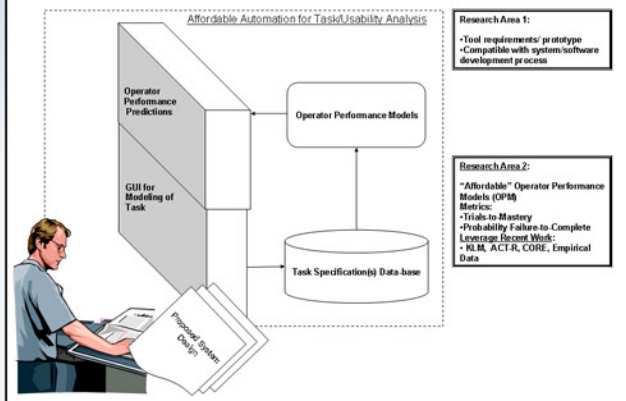
Context

- Mars & Lunar Space Exploration missions require significant increases in automation functionality to support autonomous operation
  - Significant increase in Infrequent and Safety/time-critical tasks
  - May not be trained recently
- Current methods cannot meet demand for HCI analysis
  1. Subject Testing – cost prohibitive, late in life-cycle
  2. Inspections, Walkthroughs – earlier in life-cycle, but poor inter-rater reliability

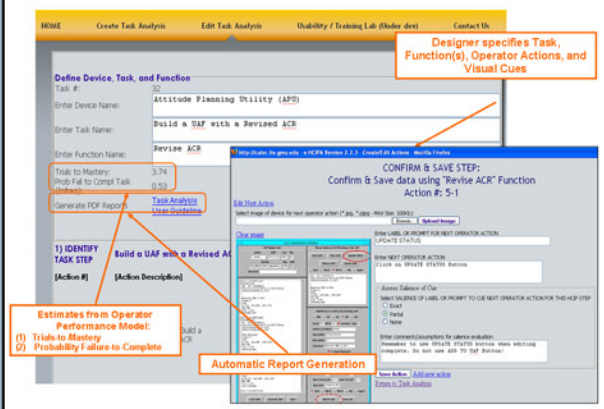
Problem Statement

- Conduct foundational research to facilitate the development of "affordable" automation for the conduct of HCI across the contractor supply-chain
- Requirements for HCI automation:
  - Wide-spread distribution of affordable tool
  - Compatible with System/Software Development Process
  - Exhibit satisfactory inter-rater reliability

Research Approach

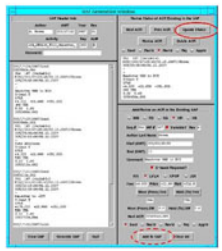


Prototype Task Analysis Tool



Results

- Domain: MOD-ISS-ADCO
- Task: Modify ACR in UAF
- Device: Attitude Planning Utility (APU)
- # Actions: 11
  - Exact Visual Cues – 5
  - Partial Visual Cues – 4
  - No Visual Cues/Memorization – 2
- Predicted Operator Performance:
  - Trails-to-Mastery: 4
  - Probability Failure-to-Complete: 0.53



Conclusions & Future Work

- Requirements for automation have been established
  - Prototype has been field tested
- Requirements for Operator Performance Models have been established
- Future Work
  - Configure and calibrate Operator Performance Models
  - automate salience assessment process to improve inter-rater reliability